

P-200CT Power Supply

The P-200 Power supply is a fixed voltage power supply designed to be used with several SWTPC kits. The P-200CT version is supplied with those parts required to power the CT-64 Terminal system and the CT-VM video monitor. The P-200CT provides the following outputs:

- +12 VDC \pm 5% @ 1.5 amps
- + 5 VDC \pm 5% @ 3.0 amps
- 3 VDC \pm 5% @ 0.1 ma.
- 12 VDC \pm 5% @ 0.1 amps
- 12 VAC \pm 20% @ 10 ma.

The power supply consists of the 3 1/8" W X 3 3/8" L X 3 3/4" H power transformer, two large 2" diameter filter capacitors, 3 1/4" W X 4" L circuit board, two regulator transistors and a 4 1/8" W X 3" H two transistor heatsink. The design utilizes integrated regulators for adjustment free outputs and built-in overload protection. The power supply may be operated from 120 or 240 VAC, 50 to 60 Hz power systems.

PC Board Construction

- (✓) Clean the copper foil side of the circuit board with a piece of Scotchbrite^R (available at most hardware stores) to remove any oxidation.
- (✓) Attach all of the resistors to the circuit board. Use the parts list and the component layout drawing to locate the proper position for each part. As with all components unless otherwise noted, mount each flush with the top of the board, bend the leads parallel to the board on the foil side and trim so that 1/16" to 1/8" of wire remains. Solder.
- (✓) Attach all of the diodes to the circuit board. Be sure the banded end of each diode matches with the outline shown in the component layout drawing. Solder.
- (✓) Install electrolytic capacitors C1 and C2 on the circuit board. Be sure to orient these components so their polarity matches with that shown in the component layout drawing. Solder.
- (✓) Using a pair of wire cutters, cut the center lead off of regulator transistor Q1. Secure the transistor to the circuit board using a

#4-40 X 1/4" screw, lockwasher and nut. The transistor must be oriented as shown in the component layout drawing and attached so the metal face is flat against the circuit board. Solder.

- (✓) Using some #18 gauge buss wire install jumpers in the two locations indicated with the number "12". Solder. Make sure NO jumper is installed in the "24" position. Use the component layout drawing for reference.
- (✓) Attach the twelve pin Wafercon connector to the circuit board. Be sure to orient the connector as shown in the component layout drawing. Solder.
- (✓) Complete the first half of steps 1 thru 13 of the wiring table. Cut each wire to the specified length and attach and solder it to the specified point on the circuit board from the top side. Do not connect the other ends of the wires to their destination terminations yet.
- (✓) This completes the circuit board assembly. Check to make sure that all connections have been soldered and that there are no cold solder joints. Also make sure that all components have been installed correctly as called for in the instructions. Take note that there are many power supply components not used in the P-200CT version of the kit. Install only those components listed in the parts list.

Attaching the Connector to the Power Transformer

Leave all of the power transformer secondary leads full length and trim each of the exposed wires so that only 1/8" protrudes beyond the insulation. Attach and solder the specified connector pins to each of the leads using the table below for reference. Use the connector reference sheet contained within this instruction set if you have any problem distinguishing between the connector pins. Do NOT insert the connector pins into the connector shell until told to do so later in the instructions.

<u>Transformer Secondary Wire</u>	<u>Connector pin Gender</u>	<u>Connector Pin #</u>
yellow	female	1
green-white	female	2
green-yellow	male	3
green	female	4
blue-white	male	7
brown	female	9
blue	female	10
blue	female	11
brown	male	12

- (✓) Take note that the back side of the male connector shell is numbered. Using the previous table, carefully insert each of the specified connector pins into the correct numerical position of the connector shell. Insert the pins from the back or numbered side of the connector and be careful not to make a mistake. The pins cannot be removed without destroying them once they have been pressed into place. This completes the transformer connector assembly.

Power Supply onto chassis assembly

- (✓) Attach the two transistor heatsink to the chassis using four #6-32 X 3/8" screws, lockwashers and nuts. Position the heatsink very carefully so the holes in the heatsink align with those punched in the chassis. Put a ground lug under the lower left hand mounting nut as shown in the chassis pictorial.
- (✓) Snap the four nylon printed circuit board mounts onto the chassis in the positions corresponding to the mounting holes on the circuit board.
- (✓) Attach the clamps for electrolytic capacitors C3 and C4 to the chassis using #6-32 X 1/4" screws, lockwashers and nuts. Orient the clamps as shown in the chassis pictorial. Leave the mounting screws loose until the capacitors have been installed as called for later in the instructions.
- (✓) Attach lug strip LS-1 to the chassis using a #6-32 X 1/4" screw, lockwasher and nut. Orient the lug strip as shown in the chassis pictorial.
- (✓) Attach fuseholder F1 to the chassis. Orient the fuseholder as shown in the chassis pictorial.
- (✓) Using a pair of pliers crimp the strain relief onto the line cord at a point about 3" from the end of the line cord and insert the compressed strain relief and line cord assembly into the 1/2" hole provided on the rear of the chassis from the outside of the chassis, then release.
- (✓) Now insert electrolytic capacitors C3 and C4 into their clamps. Use the parts list and chassis pictorial to determine position and orientation. Install them exactly as shown in the pictorial. These capacitors are polarized so the + terminal must be positioned as shown in the drawings. Secure the capacitors with #6-32 X 1/2" screws, lockwashers and nuts.
- (✓) Tighten all of the capacitor clamp mounting screws.
- (✓) Using #10-32 X 1/4" screws attach two terminal lugs to the (+) terminal and five terminal lugs to the (-) terminal of capacitor C3. Also attach two terminal lugs to the (+) terminal and five terminal lugs to the (-) terminal of capacitor C4. Use the chassis pictorial to show proper orientation.
- (✓) Orient the transformer so the four wire primary side is nearer the right edge of the chassis as shown in the chassis pictorial and secure with four #8-32 X 3/8" screws, flatwashers and nuts.

- (✓) Remove the precoated insulators from their packages and place over the pins on the bottom of regulator transistors Q3 and Q4.
- (✓) Install transistors Q3 and Q4 onto the heatsink from the outside of the chassis. Be sure you have put the right transistor in the right set of holes. Secure each transistor with #6-32 X 1/2" screws, insulated shoulder washers, ground lugs and nuts. NOTE: The case of each power transistor is electrically a transistor junction and hence must be electrically isolated from all other electrical junctions including the chassis. The mounting screws are electrically connected to each transistor case and you must be sure the screws do not contact either the heatsinks or chassis as they pass through the assembly. If you are careful to line up the mounting holes in the heatsink and the chassis before securing the transistor mounting screws there should be no problem. Keep in mind also that the wire leads of each power transistor must be centered in the large holes through which they pass. The mounting screws must be tightened evenly and with enough pressure to slightly compress the transistor insulators. The entire bottom of the transistor case must be in solid contact with the insulator for good heat transfer.
- (✓) Orient the printed circuit board as shown in the chassis pictorial and snap it onto its mounts.
- () For American standard 120 VAC line operation complete steps 14 thru 17 of the wiring table. For European standard 240 VAC operation complete steps 18 thru 20 of the wiring table. In step 19 of the wiring table it will be necessary to use some electrical tape to insulate the connection between the two transformer wires.
- (✓) Now go back and complete the second half of wiring steps 1 thru 13. When attaching the wires to the regulator transistors Q3 and Q4, slip a 1" piece of heat shrinkable tubing over each of the wires to be attached first. Solder the wire directly to the transistor pin, slip the heat shrinkable tubing over the exposed connection and shrink the tubing with the heat from your soldering iron. When making connections to J11 connector pins (supplied with the CT-64 main board kit of parts) use the connector reference sheet contained within this instruction set if you have any problem distinguishing between the connector pins. Do NOT insert the connector pins into the connector shell until told to do so later in the instructions.
- (✓) Complete wiring steps 21 thru 34 of the wiring table. Steps 23 and 24 are in reference to an optional power switch (not supplied with the kit) which may be installed on the cover, rear panel or omitted entirely. If you omit the switch, attach and solder a #18 piece of wire between F1 terminal B and LS-1 terminal A in place of wiring steps 23 and 24. References to N2 in steps 27 and 33 of the wiring table apply to a six pin male connector shell and its pins (supplied with the kit). This connector and its mate are supplied with the power supply kit to provide power for the optional CT-VM video monitor which is powered by the CT-200CT. Wiring steps 29 and 30 are in reference to the same male connector pin. Two parallel wires are necessary to reduce power supply ground noise.

- (V) Now go back insert the specified connector pins into male connector shell J11 (supplied with the CT-64 main board/kit of parts). Take note that the back side of the connector shell is numbered. Using the following table insert each of the specified connector pins from the back or numbered side of the connector and be careful not to make a mistake. The pins cannot be removed without destroying them once they have been pressed into place.

<u>Wiring Table Step #</u>	<u>Connector Pin Gender</u>	<u>Connector Pin #</u>
5	male	5
10	female	1
11	female	4
12	female	2
29 & 30	male	3
32	female	6

- (V) Insert the specified connector pins with attached wires of wiring steps 27 and 33 into the six pin male connector shell N2 supplied with the P-200CT kit. Follow the installation precautions given in the preceeding step. The assembly procedure for the mating connector shell is supplied with the CT-VM instructions.
- (V) Go back and double check all wiring steps and solder connections for correctness and completion. Even a simple mistake can cause costly damage to your power supply.
- (V) Plug the twelve pin male connector attached to the power transformer's secondary leads onto the twelve pin receptacle on the power supply printed circuit board. Be sure to orient the connector correctly. It will fit only one way.
- (V) Install fuse F1 into the fuseholder.
- () Without having anything plugged onto power connectors J11 or N2 and after making sure these connectors are not inadvertantly touching anything they shouldn't be, plug the line cord into a wall outlet and turn the power switch ON.
- () Using the metal chassis as a ground reference measure the following voltages on the two power connectors listed below. If you find that any of the voltages do not measure as specified, immediately remove power and recheck all wiring and solder connections. The voltage measurement on the -3 line may read a little low if you are not testing with a high impedance voltmeter so do not get alarmed.

Six Pin Male Connector J11

<u>Pin #</u>	<u>Voltage</u>	<u>Tolerance</u>
1	-12 VDC	+5%
2	+ 5 VDC	+5%
3	0 VDC	+5%
4	- 3 VDC	+5%
5	12 VAC	+20%
6	+12 VDC	+5%

Six Pin Male Connector N2

<u>Pin #</u>	<u>Voltage</u>	<u>Tolerance</u>
3	0 VDC	+5%
6	+12 VDC	+5%

- () If everything checks out as called for then remove power, unplug the unit and go back to the main terminal instructions for final checkout. Make absolutely sure not to get the two six pin power plugs swapped around when plugging the power connector onto the main terminal board. Once you are convinced that the power supply is working as it should be use the wire ties supplied with the kit to bundle the wires where necessary.

WIRE			FROM			TO		
STEP	LENGTH	GAUGE	PART	TERMINAL	SOLDER	PART	TERMINAL	SOLDER
1	13"	#18	PC board	A	yes ✓	C3 lug	(+)	yes ✓
2	4"	#18	PC board	B	yes ✓	Q4	B4	yes ✓
3	4 1/2"	#18	PC board	C	yes ✓	Q4	B1	yes ✓
4	11"	#18	PC board	F	yes ✓	C4 lug	(+)	yes ✓
5	22"	#18	PC board	B	yes ✓	male pin	J11 #5	yes ✓
6	12"	#18	PC board	G1	yes ✓	C3 lug	(-)	yes ✓
7	5"	#18	PC board	G2	yes ✓	C4 lug	(-)	yes ✓
8	9 1/2"	#18	PC board	G3	yes ✓	C4 lug	(-)	yes ✓
9	6"	#18	PC board	G4	yes ✓	C3 lug	(-)	yes ✓
10	22"	#18	PC board	-12	yes ✓	female pin	J11 #1	yes ✓
11	21"	#18	PC board	-3	yes ✓	female pin	J11 #4	yes ✓
12	22"	#18	PC board	+5	yes ✓	female pin	J11 #2	yes ✓
13	12"	#18	PC board	+5	yes ✓	Q3	A2	yes ✓

120 VAC OPERATION

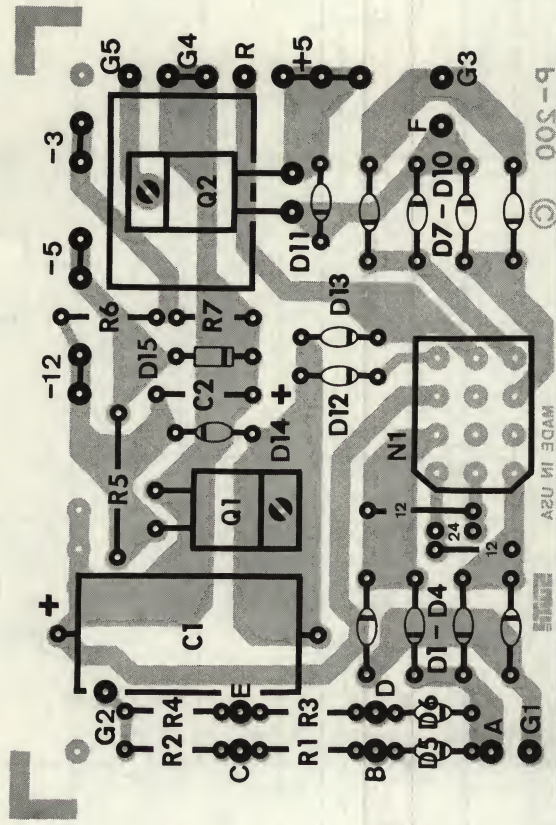
14	6"	—	T1	Black	—	LS-1	C	no
15	6"	—	T1	White	—	LS-1	C	no
16	6"	—	T1	Blk-Wht	—	LS-1	A	no
17	6"	—	T1	Blk-Red	—	LS-1	A	no

240 VAC OPERATION

18	6"	—	T1	Black	—	LS-1	C	no
19	6"	—	T1	white	—	T-1	Blk-Red	yes ✓
20	6"	—	T1	Blk-Wht	—	LS-1	A	no

21	—	—	line cord	A	—	F1	A	yes ✓
22	—	—	line cord	B	—	LS-1	C	yes ✓
23	—	#18	S1 (opt)	A	yes	F1	B	yes ✓
24	—	#18	S1 (opt)	B	yes	LS-1	A	yes ✓
25	8 1/2 "	#18	C3 lug	(-)	yes	C4 lug	(-)	yes ✓
26	8"	#18	C4 lug	(-)	yes	Q3	A4	yes ✓
27	18"	#18	C4 lug	(-)	yes	female pin	N2 #3	yes ✓
28	11 1/2"	#18	C4 lug	(+)	yes	Q3	A1	yes ✓

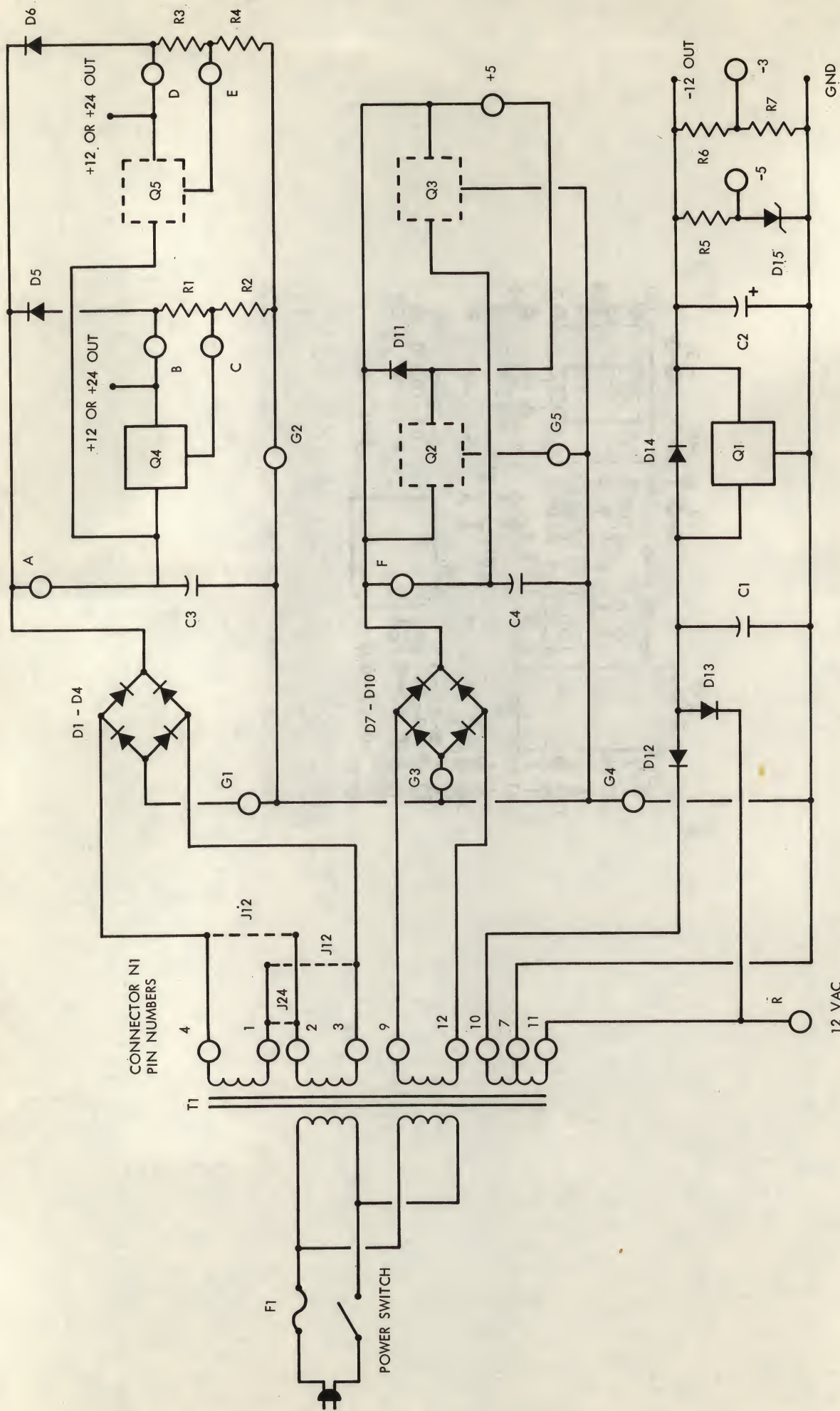
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00S-9

A2U NI EQAM

12 24 12



12 VAC
60 HZ REFERENCE

SCHEMATIC P - 200 POWER SUPPLY

Parts List P-200CT Power Supply

Resistors

___	R1	240 ohm 1% resistor /237
___	R2	2030 ohm 1% resistor
___	R6	723 ohm 1% resistor
___	R7	240 ohm 1% resistor /237

Diodes

___	D1*	1N5402 high current diode
___	D2*	" " " "
___	D3*	" " " "
___	D4*	" " " "
___	D5*	1N4003 diode
___	D7*	1N5402 high current diode
___	D8*	" " " "
___	D9*	" " " "
___	D10*	" " " "
___	D11*	1N4003 diode
___	D12*	" "
___	D13*	" "
___	D14*	" "

Capacitors

___	C1*	1000 mfd @ 25 VDC electrolytic capacitor
___	C2*	1 mfd @ 15 VDC tantalum electrolytic capacitor
___	C3*	20,000 mfd @ 25 VDC electrolytic capacitor
___	C4*	29,000 mfd @ 15 VDC electrolytic capacitor

Regulators

___	Q1*	LM320T-12 -12 VDC regulator
___	Q3*	LM323 +5 VDC regulator
___	Q4*	LM317 adjustable regulator

Misc.

___	T1*	Power transformer 50-60 Hz
		Primary: 120/240 VAC
		Secondaries: 12 VAC @ 1.5 amp
		12 VAC @ 1.5 amp
		7 VAC @ 3 amp
		24 VAC @ 200 ma
___	F1	2 1/2 amp slo-blo fuse

All components flagged with a (*) must be oriented as shown in the component layout drawing and pictorials.

Connector Reference Sheet

In order to avoid confusion in distinguishing between the various connectors supplied with our many kits, we are including this connector reference sheet with the kit instruction set. We have had a great many customers interchange the male and female connector shells when assembling their kits so we have clearly illustrated each connector along with its proper name and gender on this reference sheet. All are shown actual size.

